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The Impact of Treaties on Commercial Space Operations

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This paper depicts a colony of people living and working on a space station. A major activity of the colony is the manufacture of items of higher quality and usefulness than if manufactured on Earth, because of the gravity factor. Daily flights from Earth bring supplies and new personnel. Items manufactured on the station and returning personnel are carried on the return flight. The crew of the aerospacecraft, the passengers aboard and the personnel of the space station are a mix of military and civilian personnel, including Government and contractor employees. Nationals of many States are passengers on the flights and live and work on the space station pursuant to international agreements providing for joint projects on the station. This paper considers the impact of treaties on the above depicted setting. Included are not only the major Space Law treaties, but others on various subjects which affect space activities.

I. INTRODUCTION

This is a good time to discuss the impact of treaties on commercial space operations as October 10th was the tenth anniversary of our first and most significant Space Law treaty. I refer, of course, to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.[1] While the Treaty's effective date, following deposit of necessary instruments of ratification, was October 10, 1967, separate signing ceremonies were held on January 27, 1967, at Washington, London and Moscow. The tenor of the remarks at the White House by President Johnson, Ambas-

* This paper was presented orally at the Twenty-third Annual Meeting of the American Astronautical Society.

1. Jan. 27, 1967, 18 U.S.T. 2410, TI-.I.A.S. No. 5604, 610 U.N.T.S. 205 (effective October 10, 1967) [hereinafter referred to as 1967 Space Law Treaty].

sador Dean of Great Britain, and Ambassador Dobrynin of the Soviet Union was of mutual cooperation among nations and emphasized that the attainment of the Space Law Treaty should lead to resolution of other international problems on Earth.

Mr. Arthur Goldberg, then our Ambassador to the United Nations, in speaking of the then proposed Treaty on the floor of the General Assembly, on December 17, 1966, stated:

> As man steps into the void of outer space, he will depend for his survival not only on his amazing technology, but also on this other gift which is no less precious: the rule of law among nations.[2]

II. SPACE PRODUCTS EXPERIMENTATION

Fragile man, tailored to his planet Earth, having demonstrated in Apollo missions that he can overcome hazards of travel to the moon, and in Skylab missions that he can live in weightlessness of space for an appreciable period of time during which he can maintain an experimental space laboratory, is about to embark, in the Space Shuttle, on ventures that will truly comprise another giant step for mankind. Spacelab, a laboratory developed and funded by the European Space Agency, ESA, will be carried into space by the Space Shuttle Orbiter and will provide further prospects for commercial utilization of space. Spacelab experiments will probably lead to new products and processes for the benefit of all mankind. NASA has already extended an invitation for proposals in an Announcement of Opportunity Letter, AO,[3] for materials processing investigations that will include experiments performed on flights of the Space Transportation System, STS, which term designates flights of the Space Shuttle Orbiter and Spacelab. Responding proposals are to be for projects that seek to exploit techniques made possible by space flight to acquire new knowledge about processes and material properties or to develop useful ways to manipulate materials and processes. The technical areas where prospects had been identified for space laboratory experimentation were: electronic materials, biological preparations, glass and ceramics, physical processes in fluids, and metallurgical, chemical and electrochemical processes.

All users of the STS in NASA's experimental program will be charged on a fixed price basis. It is NASA policy not to acquire patent rights to inventions, patent or proprietary data privately funded by a user, or arising out of activities for which a user has reimbursed NASA under stated policies. The user will be required to provide NASA with sufficient

2. Menter, *The Developing Aerospace Law*, 14 J. ASTRONAUTICAL SCI. 255, 261 (1967).
3. NASA A.O. No. OA-77-3 (Feb. 8, 1977) § III 1, 2.

information to verify peaceful purposes, and to insure Shuttle safety and NASA's and the Government's obligations.[4] The initial STS mission will be a joint NASA/ESA mission of one week duration during 1980.[5]

III. COMMUNITIES IN SPACE

Many writers, and various studies, envision concepts of massive space stations in space and on the moon and of large, almost self-contained, space communities to which people emigrate from Earth. Dr. James C. Fletcher, then Administrator of NASA, in an April 1977 publication stated: "About a decade from now — in the mid 1980's — the ancient fantasy of the space station should begin to approach reality."[6] Professor Gerard K. O'Neill of Princeton University published his concept of space colonization with 10,000 persons.[7] Professor J. Peter Vajk envisions "given another 50 years of improvements in Earth launch vehicles, it is not unreasonable to envisage tens of millions of passengers per year traveling between Earth and the [space] colonies."[8] As the scientist advises on the technical feasibility of a space development, the attorney must address himself to its legal and political aspects. There already have been several excellent articles by individuals of the Association of United States Members of the International Institute of Space Law, a co-sponsor of this Conference.[9]

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4. *Subject: Reimbursement for Shuttle Services Provided to Non-U.S. Government Users*, NASA MANAGEMENT INSTRUCTION (NMI) 8601.8 paras. 4a(1), 6 (1977). The price will be based on estimated costs and will be held constant in the first three years of STS operations. Thereafter, the price will be adjusted annually to insure that NASA's aggregate costs are recovered over a twelve-year period. Earnest money is to be paid to NASA prior to the contract negotiations. *Id.* at paras. 4a(2), (3), (5); 4g.

5. NASA News Release 77-26, Feb. 16, 1977. The STS will carry a crew of four—the commander, pilot, mission specialist and payload specialist. Up to three additional payload specialists may be added, depending on the mission requirement. These might be scientists or engineers carrying out experiments in Spacelab. Two hundred and twenty-two scientists representing the U.S. and 14 other countries have been selected for the first STS mission which will have two payload specialists, who, working with the crew of the Orbiter and scientific and technical investigators on the ground, will perform various experiments.

6. Fletcher, *Communications Satellites: Past and Future*, COMPUTERS & PEOPLE, April 1977, at 18, 20.

7. O'Neill, *The Colonization of Space*, PHYSICS TODAY, Sept. 1974, at 32.

8. Vajk, *The Impact of Space Colonization on World Dynamics*, in TECHNICAL FORECASTING AND SOCIAL CHANGE 361, 391 (1976).

9. *See e.g.* Christol, *Space Stations: Present and Future*, a paper presented at the 25th International Astronautical Federation Congress, Amsterdam, The Netherlands, Oct. 1, 1974; Gorove, *The Future of Space Law: A Legal Regime for Space Colonies*, PROCEEDINGS OF THE 19TH COLLOQUIUM ON THE LAW OF OUTER SPACE, INTERNATIONAL INSTITUTE OF SPACE LAW, IAF, (Oct. 12-15, 1976, Anaheim, California) at 47. In the same PROCEEDINGS, *see* Dula, *Legal and Economic Prerequisites to Space Industrialization*, 257; Finch, Jr., *Energy-Ecospace*, 124; For an excellent discourse on the concepts upon which Space Law is formulated, past and future, *see also* (in the same PROCEEDINGS) E. Galloway, *The Future of Space Law*, 2.

An engineering system design study on "Space Settlements," jointly sponsored by NASA and the American Society for Engineering Education, was held at Stanford University during the summer of 1975. The study conclusions and recommendations are to be attributed to the participants and not the sponsors. Nineteen professors of engineering, social science and architecture were major participants in the study which depicts a space colony in a fixed relation to the Earth and the moon. The moon is mined for oxygen, aluminum, silica, and undifferentiated matter necessary for shielding and transported to the space station for refinement and processing. With small amounts of materials from Earth, solar power stations are built which are moved to synchronous orbit. The colonists grow their own food at the space station. Rather than continual dependence on the moon or the Earth, the colony would seek to obtain its materials from asteroids. The study report states: "Given that source, the 'limits of growth' are practically limitless: the total quantity of materials within only a few known large asteroids is enough to permit building space colonies with a total land area many thousand times that of the Earth."[10] The report further depicts a tourist's visit to the space colony, with architectural drawings of the colony's structure and with interior views of office buildings, homes, streets and flora.[11]

Let us assume that by the year 2050 the space community just described has been established by the United States on an expanding space station over a period of years. There, private companies are engaged in the manufacture of medical compounds, ball bearings, crystals, electronic components and various other products where adhesion and cohesion effects dominate the composition of the article concerned and which may be improved upon in a high vacuum and in zero gravity. Laboratories of the space station carry on further experimentation in improving old and creating new products and processes, including extensive medical research. The total supply of some items is manufactured locally, while the supply of others is imported from Earth. Telescopes of an observatory seek to increase man's knowledge of his galaxy and of other galaxies in space with new data as to the early development of the Earth and its inhabitants. Pursuant to bilateral agreements, many nationals of other States are working with U.S. personnel on joint projects. Satellite solar power stations, and other satellites engaged in communications, remote sensing of the Earth and its environs, collating and reporting weather information or performing other assigned tasks, are periodically visited and serviced by members of the space community.

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10. SPACE SETTLEMENTS—A DESIGN STUDY,, NASA SP-413, at 56, 60 (1977).

11. *Id.* at 87-110. *See also* A FORECAST OF SPACE TECHNOLOGY 1980-2000, NASA SP-387, pt. 2, § 1 (1976). OUTLOOK FOR SPACE, A REPORT TO THE NASA ADMINISTRATOR BY THE OUTLOOK FOR SPACE STUDY GROUP, NASA SP-386, at 178 (1976).

In this scenario, let us further depict a daily aerospaceplane flight from Earth bringing supplies and new personnel. The return flight to Earth carries items manufactured in the space community and returning personnel. The crew of the aerospaceplane, the passengers aboard and personnel of the space station are a mix of military and civilian personnel, including Government and contractor employees and personnel of private concerns and organizations.

IV. IMPACT OF TREATIES

A. General

Of course, by the year 2050 we shall have several additional treaties and implementing legislation tailored to govern space activities. However, four Space Law treaties are already in force. The Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, COPUOS, currently has under study three additional subjects with the view of formulating principles for draft treaty proposals. Priority consideration is accorded the subjects within COPUOS by recommendation of the UN General Assembly.[12] The impact of the current Space Law treaties and selected other treaties believed applicable to commercial space activities is now considered. A reading of the Space Law treaties will reflect that they are premised upon international good will, understanding and accord. Their provisions were arrived at during sessions of the UN COPUOS Legal Subcommittee by a recognized consensus of all participants.

B. Government Supervision and Control

The 1967 Space Law Treaty does envisage commercial activity in space. Such activities, however, "require authorization and continuing supervision by the appropriate State Party to the Treaty." This recital follows a mandate that a State Party to the Treaty "shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present . . . Treaty."[13] Article IX of the 1967 Space Law Treaty requires States in their exploration of the moon and other celestial bodies to "conduct all their activities . . . with due regard to the corresponding interests of all other States . . . ." If a State has reason to believe that the space activities of its

12. 31 U.N. GAOR 8 (1976); *see* U.N. Doc. A/AC 105/196 at 2, para. 3 (1977).

13. 1967 Space Law Treaty, *supra* note 1, art. VI. A similar recital is set forth in Principle X of the UN COPUOS Legal Subcommittee Working Group's draft of legal principles for possible treaty proposal on remote sensing of the Earth from space, U.N. Doc. A/AC 105/196, Annex III, at 6 (1977) [hereinafter UN COPUOS Subcommittee Document].

national would cause potential interference with the activities of another party State in the latter's peaceful exploration and use of outer space, the first State must take appropriate international consultations before permitting its national to proceed with the planned activity. Conversely, if such first State has reason to believe that another State, or its nationals, are planning an activity which would potentially cause harm to its peaceful activities in space, it may request consultation concerning such activity.[14]

A State permitting its national to engage in space activity retains its responsibility to assure that such activities avoid harmful contamination of space and adverse impact on the environment of the Earth resulting from the introduction of extraterrestrial matter.[15]

C. Exploitation of Natural Resources of Celestial Bodies

Commercial space operations on the moon, on other celestial bodies, or on a space station or otherwise in space cannot result in acquisition of sovereignty for the sponsoring State as Article II of the 1967 Space Law Treaty expressly precludes national appropriation "by claim of sovereignty, by means of use or occupation, or by any other means." However, this does not deny the construction, ownership or use of facilities on celestial bodies or in space. Further, such phrase is not believed intended as a prohibition of the exploitation of the natural resources of the moon or other celestial bodies. Article I of the Treaty provides that the moon and other celestial bodies "shall be free for exploration and use by all States without discrimination of any kind . . . [which] shall be carried out for the benefit and in the interests of all countries . . . and shall be the province of all mankind." These and other provisions authorizing exploration of the moon and other celestial bodies appear to have been construed as not prohibiting exploitation as long as it was otherwise in accord with international law and was for the general benefit and interest of all countries. Regulations such as these may be equated with the regulations of deep sea fishing and the removal of mass amounts of fish from the free high seas. A review of the drafts of a proposed "Moon Treaty" by the Legal Subcommittee of the UN COPUOS at its 16th Session, March 14 — April 8, 1977, reveals no objection, as such, of the Subcommittee to exploitation of the moon's resources, but the consideration of establishing an international regime to govern such exploitation.[16]

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14. 1967 Space Law Treaty, *supra* note 1, art. IX.

15. *Id. see also* Robinson, *Earth Exposure to Martian Matter: Back Contamination Proceedures and International Quarantine Regulations*, 15 COLUM. J. TRANSNAT'L L. 17 (1976).

16. UN COPUOS Subcommittee Document, *supra* note 12, Annex F, at 6-7 ("article X bis" draft Treaty Relating to the Moon and Other Celestial Bodies).

D. Ownership and Registration of Space Objects

While the "Working Group" partial draft of a Moon Treaty would expressly preclude vesting of title, i.e. ownership, in any person, organization, corporation or country, of any area of the moon's surface or subsurface, such draft and Article VIII of the 1967 Space Law Treaty recognizes ownership of objects constructed on the moon or on celestial bodies; the Treaty further expressly provides that ownership is retained in objects launched into outer space.[17] When a space object is launched into outer space, it is to be registered by the launching State in a registry which it maintains. Such State furnishes to the UN Secretary General specified information which is entered on a Register maintained by him. In instances of a joint launch, the countries concerned determine which of them shall register the object launched. The term "space object" includes its component parts.[18] An object launched into outer space and later found outside the jurisdiction of the launching State is returned or held at the disposal of representatives of the launching State. The launching State is to bear the expenses of recovery and return.[19]

The space shuttle, a space platform or space station, when in space, would all be space objects required to be registered under the Convention on Registration of Objects Launched into Outer Space. As additions are made to a space platform or space station, appropriate notation can be made on the registry concerned.[20]

E. Claims Liability

At the present time there are nearly one thousand payloads and space probes in space. In addition, there are over 3400 pieces of debris in space from Earth launches. Further, over 5800 objects, including debris, have decayed and are no longer in space.[21] With few exceptions, returning debris has not reached the Earth's surface. Should such debris survive

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17. *Id.* art. X. *See* 1967 Space Law Treaty, *supra* note 1.

18. Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, arts. I-IV, T.I.A.S. 8480 [hereinafter cited as Registration Convention].

19. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched Into Outer Space, April 22, 1968. United States—Great Britain and Northern Ireland—U.S.S.R. art. 5, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119.

20. Registration Convention, *supra* note 18, art. IV, para. 2.

21. The "Satellite Inventory", as of 0900z, September 4, 1977 was as follows: Payloads in orbit—907, of which 388 belong to the U.S. and 437 to the U.S.S.R.; Space probes in space—55, of which 28 are U.S. and 25 U.S.S.R.; Payload debris in orbit—3,450, of which 2,440 are U.S. and 944 U.S.S.R.; probe debris—48, of which 39 are U.S. and 8 U.S.S.R.; objects owned by other than U.S. and U.S.S.R.—151. Total objects in space—4,460. In addition, there have been 1,183 payloads and 4,677 pieces of debris that have decayed on return towards Earth. About 50 pieces have survived through the admosphere with no personal injuries resulting and very minor property damage. "Satellite Inventory" obtained from Public Affairs Office, NORAD, Colorado Springs, Colorado.

and cause injury or damage to persons or property of a non-participant national of other than a launching State, the party injured could pursue a claim under Article VIII of the Convention on International Liability for Damage Caused by Space Objects, directly against the launching State, whether the object launched was owned by a private corporation, an association, or the launching State. By definition, a "launching" includes an attempted launching; a "launching State" means a State which launches or procures the launching of a space object, and a State from whose territory or facility a space object is launched; and a 'space object' includes component parts of a space object as well as its launch vehicle and its parts. The liability under the Claims Liability Treaty is absolute, that is, the claimant need not prove fault, but only damage sustained and that the claim is against a launching State, where the damage is on the surface of the Earth or to aircraft in flight. If, however, the damage is to a person aboard a space object of another State, and the injury does not occur on the surface of the Earth, liability is determined on the basis of fault.[22] Whether a State has recourse against its own national whose payload caused the damage would depend on its own law and launch agreement with the payload owner. A national of the launching State would look to the law of such State for his recompense. Both NASA and the Department of the Air Force administer claims procedures under laws passed by the Congress governing payment for damage from a launched object. The military's ceiling on administrative settlement of claims incident to noncombat activities is $25,000;[23] NASA's ceiling is $5,000.[24] Meritorious claims above such amounts are certified to Congress for consideration and payment. A person eligible to file a claim under Article VIII of the Claims Liability Treaty is not precluded from filing suit or a claim in the courts or administrative agencies of the launching State. However, in so doing, such person cannot pursue his claim for the same loss under the Claims Liability Treaty and may well lose the benefit of absolute liability of the launching State accorded him under the Treaty.

F. Responsibility for Personnel in Space

Under Article VIII of the 1967 Space Law Treaty, a space object launched into outer space, including all persons aboard, remains subject to the "jurisdiction and control" of the State of registry while in outer space, while on a space station, or while on the moon or other celestial body. However, where there are two or more launching States involved with respect to a space object, they may enter into agreements with

22. Convention on Liability for Damage Caused by Space Objects, *opened for signature*, March 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 (*effective date for U.S.* Oct. 9, 1973) arts. I-III.

23. 10 U.S.C. §§ 2733, 2734 (1975).

24. 42 U.S.C. § 2473(c)(13) (Supp. 1977).

respect to jurisdiction and control over the space object and its personnel notwithstanding their determination as to the State on whose registry the space object is carried.[25] While the Treaty recital of retention of jurisdiction may be self-executory for some States, it is not for the United States. Separate Congressional action is necessary as, with few exceptions — such as in the case of counterfeiting currency or plotting to overthrow the government by force — our criminal law does not extend beyond United States territorial jurisdiction.[26] However, military personnel on active duty in the United States armed forces are subject to the Uniform Code of Military Justice wherever they may be serving.[27] The Congress has under present consideration a Restatement of the United States Criminal Code which includes provisions to extend United States criminal jurisdiction to certain offenses committed aboard spacecraft or otherwise in outer space.[28] While the United States may thus obtain jurisdiction, it is recognized that another State under the nationality principle may also have jurisdiction; and that under the facts of a particular situation, the United States having primary jurisdiction may waive its jurisdiction as a matter of international comity in favor of the State of which the offender is a national.[29]

States contemplating establishing space stations having personnel aboard must also assure the existence and adequacy of governing civil law

25. Registration Convention, *supra* note 18, art. II.

26. *See* U.S. v. Cordova, 89 F. Supp. 298 (E.D.N.Y. 1950). The Court held that the then existing Federal Criminal Code (Title 18, U.S. Code) did not extend to an assault committed aboard a U.S. air carrier in flight over the high seas. In 1952, Congress amended the Code by extending the U.S. Maritime and Territorial Jurisdiction to personnel aboard U.S. registered aircraft in flight over the high seas (*see* 18 U.S.C. § 7(5) (1969)).

27. 10 U.S.C. § 802 (1975).

28. *See* S.1437, 95th Cong., 1st Sess., §§ 203(c), 204. The term "aircraft" is defined in § 111, p. 14, as including "any craft designed for navigation in air or in space." By this definition, spacecraft would fall within the "special aircraft jurisdiction" provided by § 203(c), and jurisdiction would obtain over an offense when the section in the bill on such offense recites its application to the special aircraft jurisdiction. Other offenses occurring in space may be encompassed by recitals in § 204 on "Extraterritorial jurisdiction." For a more in-depth discussion of the above, *see* Menter, *Jurisdiction Over Man-Made Orbital Satellites*, 2 J. SPACE L. 19 (1974).

29. Such jurisdiction was waived by the U.S. in 1953 in a case in which the author was involved as Staff Judge Advocate of the U.S. Far East Air Forces. A Japanese national employed by the U.S. Forces in Iwo Jima was alleged to have murdered a fellow Japanese national on such Island. At that time, the U.S. had sole jurisdiction over the Island. Nevertheless, as Japan had jurisdiction over its national for offenses wherever occurring, the accused with the consent of the Procurator General of Japan was delivered to the Japanese authorities. Another case recalled by the author, on a lighter note, occurred in San Antonio, Texas in about 1956. There, two German Air Cadets, on temporary duty at Lackland Air Force Base, were arrested while off duty by local police for discharging pistols in a municipal park. The Bexar County District Attorney agreed to waive jurisdiction on the understanding that the matter would be referred to the senior German Officer at the Base for his determination of appropriate administrative or disciplinary disposition. It is recalled that the local city press quoted one of the German Cadets as stating: "I thought fiing your pistols was what was expected in Texas."

for such station(s). Perhaps we can follow the precedent whereby Congress provided for the Trust Territory of the Pacific Islands. The Congress provided that all legislative, executive and judicial authority necessary for the civil administration of the Trust Territories was to be vested in a person selected by the President, by and with the advice and consent of the Senate.[30] It should be noted that the jurisdiction then provided was over territory in which the United States did not possess sovereignty. This is particularly apropos as it will be recalled that Article II of the 1967 Space Law Treaty expressly precludes any claim of sovereignty with respect to outer space and celestial bodies. Under a somewhat similar authority, the Secretary of Interior promulgated a "Wake Island Code" covering civil and minor criminal offenses. It is conceivable that after a period of growth, a station be granted authority for self government and perhaps given a commonwealth status.[31]

I've previously mentioned the obligation under treaty of returning a launched object to the launching State if the object be found outside the territorial limits of the launching State. The same international agreement is generally referred to as the "Rescue and Return of Astronauts Agreement." The text of the Treaty does not employ the term "astronaut," but speaks of rescue of "personnel of a spacecraft." If such personnel land in another State's territory by reason of accident, distress, emergency, or unintended landing, such State, if a party to the Agreement, is obligated to "immediately take all possible steps to rescue them and render them all necessary assistance." If the landing is on the high seas or "in any other place not under the jurisdiction of any State," States party to the Agreement are obligated to extend assistance, if necessary, in search and rescue operations to assure a speedy rescue. The rescued "personnel of a spacecraft" are to be "safely and promptly returned to representatives of the launching authority."[32] Personnel of a corporation or other organization aboard a spacecraft on a lawful mission would be entitled to the benefits recited from the Rescue and Return of Astronauts Agreement.

G. Space Communications

Television transmission of news and events occurring thousands of miles away is now a daily routine, and in many States comprises a commercial utilization of space. To assure non-interference in communi-

30. 48 U.S.C. § 1681(a) (Supp. 1977).

31. *See, e.g.*, Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America. Included in the Covenant are provisions for studies to be undertaken to determine the provisions of the U.S. Constitution and the Federal laws to be made applicable to the Commonwealth. Pub. L. 94-241, 90 Stat. 263, 48 U.S.C. § 1681(b) (notes).

32. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *supra* note 19, arts. 2-4.

cation via satellite, the International Telecommunication Union (ITU) has made frequency allocation, prescribed coordination procedures and technical standards pursuant to the International Telecommunication Convention, 1973.[33] Annex 3 of the Convention contains an agreement between the United Nations and the ITU, wherein the ITU is recognized as a "specialized agency" of the United Nations. In Article VII of the Agreement, the UN General Assembly authorized the ITU to request advisory opinions of the International Court of Justice "in legal questions within the scope of its competence . . . ." The Convention, relative to space radio services, provides in Article 33, paragraph 2:

> In using frequency bands for space radio services Members shall bear in mind that radio frequencies and geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of Radio Regulations according to their needs and the technical facilities at their disposal.

Current Radio Regulation provisions (Articles 5,7,9, and 15) include provisions for space transmission, including frequency allocation, coordination procedures, obtaining frequencies to assure noninterference, and technical standards for Government-to-Government communication.[34] Parties are enjoined to resolve communication interference problems, but if unable to do so, may refer the matter to the International Frequency Registration Board for resolution pursuant to recitals in Article 54 of the Radio Regulations. The 1973 Convention provided for the calling and attendance at a World Administrative Radio Conference (WARC). The most recent WARC was convened in Geneva on January 10, 1977. It was called "for the planning of the broadcasting-satellite service in frequency bands 11.7-12.2 GHz (in Regions 2 and 3) and 11.7-12.5 GHz (in Region 1)." Region 1 is Europe and Africa; Region 2, the Americas; and Region 3, Asia. The WARC delegates adopted, subject to the approval of

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33. Convention on Telecommunication, *opened for signature* Oct. 25, 1973, T.I.A.S. No. 8572. The agreement was made at Malaga-Torremolinos.

34. For example, relative to control of interference between Geostationary Satellate Systems and non-synchronous inclined Orbit-Satellite Systems, the ITU Radio Regulations provide in 470VA § 25:

> Non-geostationary space stations in the fixed satellite service shall cease or reduce to a negligible level radio emissions, and their associated earth stations shall not transmit to them whenever there is insufficient angular separation between the non-geostationary satellite and geostationary satellites and unacceptable interference to geostationary satellite space systems operating in accordance with these Regulations.

Further, the ITU Radio Regulations 470VC § 26 provide that stations on geostationary satellites:

> shall have the capability of maintaining their positions within ±1 degree of longitude of their nominal positions, but efforts should be made to achieve a capability of maintaining their positions at least within ±0.5 degree of the longitude of their nominal positions.

their respective States, a plan for Regions 1 and 3 assigning fixed frequency and orbital slots, and determined that a plan for Region 2 should be brought into being by 1982. Decisions were also made rearranging the Radio Regulations. The WARC's Final Acts, under Article 15, are to become effective at 0001, GMT, January 1, 1979.

A new WARC is scheduled to be held in Geneva commencing September 24, 1979 for a ten-week period. The delegates will decide how the entire useable radio spectrum, from 10 KHz to at least 275 GHz, will be shared until the year 2000 in light of new technology and new spectrum requirements. The Chairman of the U.S. Federal Communications Commission has appointed several advisory committees to assist the Commission in its preparation for the 1979 WARC, including, among others, advisory committees for radio services for Broadcasting Satellite; Fixed-Satellite; International Broadcasting; Private Micro-wave; Radio Astronomy; and Television Broadcasting. Further, Notices of Inquiry, to determine the best United States proposals to modify the International Table of Frequency Allocations and associated Radio Regulations in order to meet future telecommunication needs, were published in the United States Federal Register.[35]

The Legal Subcommittee of the UN COPUOS also looks to the WARC in its efforts to draft principles "on use by States of artificial earth satellites for direct television broadcasting." One issue on which the ITU has done substantial work but which is still discussed in the UN is how to deal with the "spillover" of satellite television broadcasts on the territory of neighboring States. Another major issue yet unresolved is the purported conflict of the principle of free flow of information and the principle of respect for State sovereignty.[36]

All are aware of the success of INTELSAT for international communications via satellites. More regional "sats" are being organized by various groups of countries, such as INTERSPUTNIK, AFROSAT and

35. FCC Docket 20271, FCC-77-349; 42 Fed. Reg. 27,756 (1977).

36. *See* Annex II, Report of the Legal Subcommittee, COPUOS, on the work of its 16th session, March 14-April 8, 1977, U.N. Doc. A/AC.105/196, April 11, 1977. The U.S. view has consistently supported freedom of information. For a paper stressing the principle of "state sovereignty" in DBS and other space law subjects, *see* Vereschetin, U.S.S.R. Academy of Sciences, *Perspectives of the Uses of Outer Space for Applied Purposes and State Sovereignty*, PROCEEDINGS OF THE 19TH COLLOQUIUM ON THE LAW OF OUTER SPACE, IISL, (October 12-15, 1976, Anaheim, California) 103-107 [hereinafter PROCEEDINGS OF THE 19TH COLLOQUIUM]. For a view that the operational practice and technology of DBS minimize the issue of intrusive broadcasting and that the prospective benefits of direct broadcasting far outweigh the fears which have developed out of "abstract discussions" of "soreignty" on the one side and "freedom of information" on the other, *see* Frutkin, *Direct/Comunity Broadcast Projects Using Space Satellites*, 3 J. SPACE L. 17 (1975).

ARABSAT.[37] The U.S.S.R., Canada and Indonesia have domestic communication systems in operation, and Japan is about to establish a system on an experimental basis. Additionally, domestic satellite systems are now owned and operated by domestic corporations, such as RCA, Western Union and Comsat-General. There are ever increasing substantial advances in computer and communications technology. The operations of many large commercial concerns are benefited by use of communication networks, including television, that link various separated components of a company. Face to face staff meetings and consultations of personnel widely separated physically, via high speed video space communications obviously greatly reduce travel and costs, as well as save the time of key personnel of the company.[38] Many new products and activities on Earth are anticipated in the near future via satellite communication; for example, wrist radiophones, personal navigation wrist set, electronic mail transmission, burglar alarm and intrusion detection, energy monitor, border surveillance, coastal anti-collision passive radar, air traffic control radar, fire detection and many more.[39] If the present International Telecommunications Convention,[40] or the implementing WARCs or ITU regulations, are believed unduly restrictive to the success of projects such as recited above, suggestion should be made for desired modifications to the Federal Communication Commission as opportunity for such submission occurs pursuant, for example, to such notices as the FCC Notices of Inquiry for the forthcoming 1979 WARC. The fifth such notice solicited proposals "which effectively promote that combination of telecommunication uses which . . . contain the flexibility necessary to accommodate new applications of this dynamic technology . . . "[41]

H. Non-Space Treaties

It is not within the scope of this paper to discuss or even identify the many treaties that have application to past commercial operations on Earth which would also have application to commercial space operations. However, I should like to mention the Patent Cooperation Treaty[42]

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37. Harvey, *Communications Satellites*, DEF. + FOREIGN AFF. (March 1977).

38. Uttal, *I.B.M. Reaches for a Golden Future in the Heavens*, FORTUNE, June 1977, at 173-184.

39. Bekey & Mayer, 1980-2000 *Raising Our Sights for Advanced Space Systems*, ASTRONAUTICS AND AERONAUTICS, July/August 1976, at 34-63.

40. Convention on Telecommunication, *supra* note 33.

41. 42 Fed. Reg. 27,756 at 27,757, para. 214 (1977). The period for filing comments expired Aug. 1, 1977 (*Id.* at para. 616).

42. Treaty on Patent Cooperation, *opened for signature* June 19, 1970, 63 DEPT. STATE BULL. 45 (1970). Treaty to be effective three months after two more ratifying States have met specified statistical conditions.

which may become effective about mid-1978. This Treaty will simplify the filing of patent applications on the same invention in different countries by providing centralized filing procedures and a standard application format. The applicant will generally file in a "Receiving Office," usually the Patent Office of his own country, and include in his application a recital of the other countries in which protection is desired. However, he is not relieved of national requirements of such other countries for filing fees and prosecution of his patent within the additional period provided.

Dr. Edward C. Welsh, then Executive Secretary of the now-defunct National Aeronautics and Space Council, in an address on January 11, 1965 before the New York Academy of Sciences stated:

> The one use of aerospace that strikes closest and most directly to the heart of the general public is transportation. We are a nation on the move. We have more commercial aircraft than any nation in the world. We will continue to expand our transportation uses of the aerospace medium. The supersonic and hypersonic transports will be followed eventually by routine flights in space.

Consideration must be given in due time to amendment of existing "Aviation Law" treaties to cover commercial space flight, or to draft desired analogous provisions in one or more separate Space Law treaties. This would include the 1944 so-called Chicago Convention which governs international air carrier transportation, and the 1969 Tokyo Convention which contains provisions authorizing the aircraft commander to impose restraint on unruly passengers for the safety of flight and good order and discipline on board.[43] Similarly, consideration should be given to Space Law treaty recital, or recognition as a matter of customary international law, of the Law of the Sea doctrine of Innocent Passage for the passage of an aerospaceplane through the airspace of an adjoining country in effecting its return landing on Earth.

IV. CONCLUSIONS

The Space Law treaties thus far adopted portray man's aspirations for international harmony in space activities. They have been drawn to encompass then foreseen activities. If an unforeseen activity later develops, or if the application of the language of a treaty to such activity is equivocal or unclear, the same force which provided the consensus

43. Convention on International Civil Aviation, *opened for signature* Dec. 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591, 15 U.N.T.S. 295. Convention on Offenses and Certain Other Acts Committed Aboard Aircraft, *opened for signature* Sept. 14, 1963, 20 U.S.T. 2941, T.I.A.S. No. 6768, 704 U.N.T.S. 219 (effective date for the U.S. Dec. 4, 1969). Menter, *Relationship of Air and Space Law*, PROCEEDINGS OF THE 19TH COLLOQUIUM, *supra* note 36, at 164.

necessary for the treaty adoption may well lead to an amendment clarifying the application of the treaty to the new activity by a change to the original wording or by the addition of a further governing principle. The current endeavors of the Legal Subcommittee of the UN COPUOS to draft a Moon Treaty will clarify the question of exploitation of the natural resources of the moon; however, in light of the desire discussed herein to possibly consume asteroids in the construction of space stations, consideration should be given to whether it is desired to expressly exclude asteroids from the term "celestial bodies." Consideration should also be given to amendment of the Registration Treaty to similarly require registration of an object launched into space from the moon. Clearly, the reasons for adoption of the Registration Treaty are equally applicable to objects launched into space orbit from the moon as from Earth. Admittedly, a construction is possible that such launches from the moon may be construed as within the present Treaty language; however, it is believed that the intent at the time of drafting was limited to then contemplated Earth launchings. The Registration Treaty itself invisages future changes by providing in Article IX that any Party to the Treaty may propose amendments thereto at any time which amendments become effective upon each Party accepting the amendment when a majority of the Parties to the Treaty have accepted it. Neither amendment herein suggested is a priority matter.

We are but at the beginning of a vast future expansion of today's use of satellites for new forms of commercial communication under ITU Regulations, issued pursuant to the International Telecommunication Convention, 1973, and supplementary WARCs. Private entities are participating in NASA's experimentation programs to improve old products and develop new products and processes in the weightlessness of space. Commercial space activities are envisaged by current and projected Space Law Treaties. Such activities must be authorized and supervised by the country concerned which bears international responsibility for the activities. The commercial entity is bound by the obligations imposed by the 1967 Space Law Treaty, viz: to conduct its exploration and use of space with due regard to the corresponding interests of other countries in their peaceful exploration and use of outer space; and to assure that its activities avoid harmful contamination of space and that no adverse changes to the Earth's environment result from the introduction of extraterrestrial matter. Space Law treaties recognize continued ownership of objects launched into space, or constructed on the moon or other celestial bodies, and require the return of space objects found beyond the terretorial limits of the launching country when the latter so requests. Personnel of a commercial entity remain subject to the jurisdiction and

control of the country of registry of their "space object" (including the Space Shuttle, later aerospaceplanes or other spacecraft) while aboard such object in space, or on a celestial body or otherwise in space, unless jurisdiction is given to another country involved in a joint launch of the space object. It is anticipated that in discharging its jurisdiction and control responsibilities, the launching country will provide for extension of its civil and criminal laws to a space station and its community for the protection of the station and the personnel thereon. The personnel of a commercial entity engaged in authorized space activities are believed entitled to the benefits provided by treaty for the rescue and return of astronauts.

I do not challenge the scientific determination that at some future date space stations to house communities can be erected and maintained in space. It is for space medicine specialists to determine the conditions necessary to maintain man's good health and ability to function in space. However, the subsistence of any space community will depend on the protection of many factors, both external and internal to the community, which permit survival. Survival will require failsafe governing procedures on construction, modification and maintenance of a spaceworthy structure enveloping the space community, and of the life supports therein. Necessary rules governing conduct in space must be determined, and penalties provided for breaches which threaten injury to the community. The extension of authority to regulate and validate civil activities within the space community must be provided and protected by treaties and by national and local governments.

The extension of the rule of law cannot assure the survival of the space community, but without it, there can be no survival.